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PREDICTING CREDITWORTHINESS WITH PUBLICLY OBSERVABLE CHARACTERISTICS: WHAT CAN INFORMAL GROUPS CONTRIBUTE TO FORMAL FINANCE IN AFRICA?

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Abstract

If publicly observable characteristics such as age, sex, household size, and education help predict borrowing from informal groups, they may also help predict creditworthiness in general. Because formal lenders can collect and consider this information cheaply, its use may help to screen poor credit risks. Econometric results suggest that age and household size may indeed indicate creditworthiness among the rural poor in Africa.

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I. Introduction

A. Beyond Descriptive Analysis of Informal Finance

People in Sub-Saharan Africa without access to formal financial institutions depend on informal groups for financial services. A huge literature describes the incarnations of these arrangements across the continent (Adams and Fitchett). Although descriptive studies are always fascinating, in many cases they praise the virtues of informal arrangements without indicating how formal arrangements can imitate them. Research should go beyond simply extolling the virtues of informal arrangements to explore feasible techniques to transplant those virtues to the formal sector.

B. The Value of Cheap Information

Informal group lenders, with cheap access to information concerning a borrower's character (willingness to repay) and financial condition (ability to repay), are generally acknowledged to be excellent judges of creditworthiness. Formal institutions which lend to the poor, on the other hand, have a dismal record of picking good credit risks. Assuming that investigating a potential borrower's character would be prohibitively costly, formal lenders base decisions on evaluations of financial condition as signalled by either collateral or the analysis of business plans and accounting records. The poor, who cannot signal financial strength in these ways, usually end up with few, if any, formal loans.

Some information about potential borrowers, namely *publicly observable characteristics*, can be obtained as cheaply by formal lenders as by informal group lenders. For example, a loan officer can easily note an applicant's sex, age, education, and household size during a short visit to a residence, and misrepresentation is not easy.

If group lenders are good judges of creditworthiness, they will not often lend to bad credit risks. If publicly observable characteristics help predict who borrows from informal groups, then they may also help predict creditworthiness. This cheap information may have substantial value in helping formal intermediaries screen applicants.

C. Objective of the Study

This study analyzes informal financial arrangements by groups in peri-urban Banjul, The Gambia. The goal of its statistical procedures is to inform disussions concerning the feasibility of incorporating the operational virtues of the informal groups in formal institutions. The analysis centers on borrowers associated with two types of group lenders, Rotating Savings and Credit Associations (*osusus* in Mandinka), and a type of local community organization in The Gambia (*kafos*). Speculation centers on a single question: Do publicly observable characteristics help predict creditworthiness?

The paper proceeds in three sections. Section I contains the study's background. Section II analyzes a binomial logit regression of borrowing on some publicly observable characteristics. Section III concludes the analysis.

II. Background of the Study

A. Group Lenders in the Sample

1. *Osusus* (Rotating Savings and Credit Associations)

Osusus in The Gambia are groups of 10 to 30 members who meet regularly to contribute a fixed amount of cash to a pot which is immediately distributed by some rule of rotation to a single member. The meetings and the contributions continue until all members get one pot. Thus, *osusus* collect cash and immediately disburse all of it. In any given turn, the pot has two components: a refund of the payments contributed by the pot's recipient in previous meetings, and a loan equal to the amount scheduled to be contributed by the recipient in future meetings.

2. *Kafos* (Community Organizations)

Kafos in The Gambia are groups of about 100 members who provide each other with basic social, financial, and insurance services. Most *kafos* maintain a common fund by occasionally collecting dues and by selling produce from a plot farmed collectively by its members. *Kafos* draw on the common fund for grants to members who suffer a shock such as an illness in the family, and for loans. Many *kafos* also collect small deposits at regular intervals and periodically return the accumulated sum, often immediately before Ramadan. Thus both *kafos* and *osusus* collect deposits, but the amount lent by *kafos* need not equal the amount collected at a given meeting, nor must every *kafo* member borrow.[1]

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[1] *Kafos* and *osusus* in The Gambia are documented by Nagarajan and others (1994), and by Shipton (1992, 1993). In order to focus on loans from groups, borrowers using individual lenders

B. The Sources of the Data

This study uses cross-sectional data collected in two random surveys during February to May 1993 in peri-urban Banjul, The Gambia. The first survey concentrated on land-market issues and was conducted by the Land Tenure Center at the University of Wisconsin-Madison. The second survey focused on horticultural markets and was conducted by the International Finance Group at the Ohio State University. Both studies included questions about transactions in financial markets.[2] The LTC survey provided 666 of the 716 observations in the data set.

The data set was restricted to observations with answers recorded for age, sex, household size, and education. This restriction resulted partly from a desire to analyze only publicly observable characteristics and partly from the need to use only those variables that were compatible between the two surveys. The sample includes 126 borrowers and 590 non-borrowers. Of the 126 borrowers, 71 used *osusus*, and 55 used *kafos*.

III. An Econometric Model of the Borrowing Decision

A. The Variables

The dependent variable **Borrow** equals unity if the informant borrows, and zero otherwise. This study assumes a logistic probability model where the likelihood that an agent will borrow depends on household size, sex, age, and education.

The integer variable **Number In Family** represents the number of people eating from a common pot. The dummy variable **Female** equals one if the informant was a woman and zero otherwise. The dummy variables **Young**, **Middle-aged** and **Older** indicate the informant's age, whether 18 to 25, 26 to 35, or over 35 years. Education is represented by three dummy variables--**Illiterate**, **Koranic**,[3] and **Literate**.

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were dropped from the data set.

[2] Roth (1993) details the methodology of the LTC survey. Nagarajan and others (1994) provide more information about the OSU survey and additional implications for Gambian financial markets.

[3] A koranic education indicates basic numeracy and the ability to recite some verses of the Koran.

B. The Hypothesis

The fundamental hypothesis is that groups screen potential borrowers according to "the degree of stability or permanence of the individual in the community. Individuals who are likely to move to other areas are systematically eliminated from participation." (Cope and Kurtz, 1980, p. 228-229). This preference arises among informal lenders because mobile borrowers can escape the sanctions for default more easily than those who cannot move. Women, for example, often have children to care for and thus may find skipping town more difficult than men would, holding other factors constant. Likewise, the rewards for staying home may be higher for members of large households.

Under this hypothesis, creditworthiness and thus borrowing should increase with age because older people relocate less often than the young. Older people also have had a chance to establish reputations. Finally, more education means more mobility and thus less creditworthiness.

Table I shows estimated directions and relative magnitudes for the effects of these variables on the probability of borrowing from an informal group. A description and interpretation of the significant results follows.[4]

1. Larger households borrow more than smaller households

This result, common in econometric analyses of informal borrowing,[5] probably reflects three factors:

- Moving has a high opportunity cost for members of large households because they abandon a larger support network;
- Large households, *ceteris paribus*, invest more in productive opportunities and consume more than do smaller households, increasing the likelihood that they would at some time desire to borrow;
- Large households have more stable cash flows because they have more interlinkages with the community and more (and more diversified) sources of

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[4] Loans result from the simultaneous interaction of supply and demand, but the data reveal only their intersection. The interpretations offered here recognize that a complete model would explicitly include both supply and demand. For example, the fact that a given agent did not borrow could be due to supply, demand, or both. Given the ubiquity of group lenders in The Gambia, however, it seems likely that most creditworthy borrowers could find willing group lenders if the potential borrower could not get loans elsewhere or did not want to get loans elsewhere.

[5] See Besley and Levenson (1993), and Cuevas and Schrieder (1991).

income from adults members. In addition, children in rural areas contribute to household income through such activities as wood collection, and water transportation, and livestock care.

2. Women borrow more than men

This result can be interpreted from at least four angles:

- Women, because of child-rearing responsibilities and for other reasons, are less mobile;
- The poor resort to informal loans only after exhausting better sources of financing. If women are poorer than men and thus have less access to formal and other sources of finance than men do, they will probably resort to informal finance more often;[6]
- Women, whether because of cultural or religious custom, responsibilities to children, or reduced literacy, hold fewer of the salaried jobs whose predictable income streams both reduce the desire to borrow and increase the ability to get loans from formal sources;
- In many subsectors in The Gambia, women dominate petty trade, an occupation where small, frequent loans are useful for financing inventories and working capital. Traders also desire to make small, frequent deposits as they sell inventory. Informal arrangements, especially *osusus*, are well-tailored to this pattern of cash flow.

3. Literacy decreases borrowing

A Koranic education increases informal borrowing, but such an education does not imply literacy. Simple illiteracy also increases informal borrowing, although the estimated coefficient is different from zero only at the 13 percent level. This result can be seen from two angles:

- Literacy is often required for salaried government jobs whose smooth income streams simultaneously reduce the desire to borrow and increase the ability to borrow;
- Young men are the largest group of literates in The Gambia, and neither the young nor the male borrow informally as much as the older and the female do.

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[6] For example, agricultural cooperatives make fertilizer loans primarily to men. The men often relend or sell the fertilizer to their wives or others (Shipton, 1993).

4. The middle-aged borrow more than the young

Three factors may make middle-aged borrowers more attractive credit risks than younger borrowers:

- Older people are less likely to move than are younger people;
- An older potential borrower may have already established a reputation over a lifetime of interactions;
- Older people may have better informal guarantees, be they physical collateral or cosigners.

5. What can cheap information reveal about creditworthiness?

The highly significant Chi-square statistic in Table I suggests that publicly observable characteristics may indeed help a formal lender predict a potential borrower's creditworthiness. This is correct, up to a point. It does make sense for formal lenders to capitalize on the insight that informal lenders judge older people and people with larger families to be better credit risks than otherwise. It does not make sense, however, to conclude that education reduces creditworthiness, nor that women are better credit risks than men. It is more likely that males and educated people borrow from informal groups less because their better creditworthiness increases their access to more-preferred sources of finance. Although all of the publicly observable characteristics analyzed here help predict borrowing from informal groups, not all of them help predict creditworthiness.

The regression results do indicate that group lenders do consider some illiterate women to be creditworthy. This does not mean that formal lenders should begin giving preference to illiterate women, but it does imply that even the poorest of the poor desire financial services and can fulfill their obligations under adequate incentive structures.

6. Estimated effects on the probability of borrowing

Graph I illustrates the effects on the probability of borrowing caused by changes in household size and age, holding education constant at *illiterate*. The bottom solid curve traces the probability of borrowing for a *young* female as household size increases, while the top dashed curve represents the corresponding probability for a *middle-aged* female. Holding everything else constant, the effect of changing from young to middle-aged is the vertical difference between the two curves.[7] The effect of changing the household size, *ceteris paribus*,

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[7] The absolute magnitudes of the independent variables on the probability of borrowing is not directly apparent from Table II because the probability of borrowing is a non-linear function of all the independent variables and all the estimated coefficients (Greene, 1993, p. 639). Let **X** be a vector of variables including: a **constant**; an integer variable **number in family**; two dummies

is the vertical distance between the two points on a given curve that correspond to the different household sizes. The effect of age and household size on the probability being judged creditworthy by group lenders seems large enough to merit attention from formal lenders.

IV. Summary: Some Publicly Observable Characteristics Help Predict Creditworthiness

Formal lenders may be able to profit from the fact that older people and people in larger households are more likely to be creditworthy than are younger people or people in smaller households. This result is inferred because informal groups are good judges of credit-worthiness and people with these characteristics borrow more from informal groups than others do.

The feasibility of incorporating these publicly observable characteristics in the process of screening potential borrowers depends on the decreased costs of less delinquency and default and the increased costs of collecting, calculating, and considering the extra information. The net benefit could very well be positive because obtaining and handling this simple information should be cheap.

Knowledge of characteristics cannot completely substitute for knowledge of character. Women and non-literates are significantly more likely to borrow informally than are men and literate people, but this probably does not mean that illiterate females are especially good credit risks. Rather, it probably means that men and literate people either borrow from other sources or do not desire to borrow as much.

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for sex, **male** and **female**; three age dummies **young, middle-aged** and **elderly**; and three education dummies **literate, illiterate**, and **koranic**. For example, $\mathbf{X}$=[1 8 0 1 1 0 0 0 1 0] corresponds to an informant in an 8-person household who is female, young, and illiterate. Let β be a vector of estimated coefficients from logistic regression, in this case, [-4.367, 0.045, 0.000, 1.539, 0.000, 0.907, 0.394, 0.000, 0.705, 0.900]. Under the logistic probability model, the likelihood of borrowing is $\exp(\mathbf{X}'\beta)*[1+\exp(\mathbf{X}'\beta)]^{-1}$. Since $\exp(\mathbf{X}'\beta)=\exp[1*(-4.367)+8*0.045+1*1.539+1*0.705]=0.172$, the probability of borrowing in this example is $0.172/1.172=0.146$. The effect of moving from young to middle-aged is calculated by changing the fourth and fifth elements of $\mathbf{X}$ to give [1 8 0 1 0 1 0 0 1 0]. Repeating the calculation gives $0.425/1.425=0.298$. Thus, for an illiterate female in an 8-person household, moving from youth to middle age changes the probability of borrowing by $0.298-0.146=0.152$. This difference has been marked on Graph I.

Table I. Estimated Coefficients For Binomial Logistic Regression of the Borrowing Decision on Publicly Observable Characteristics.

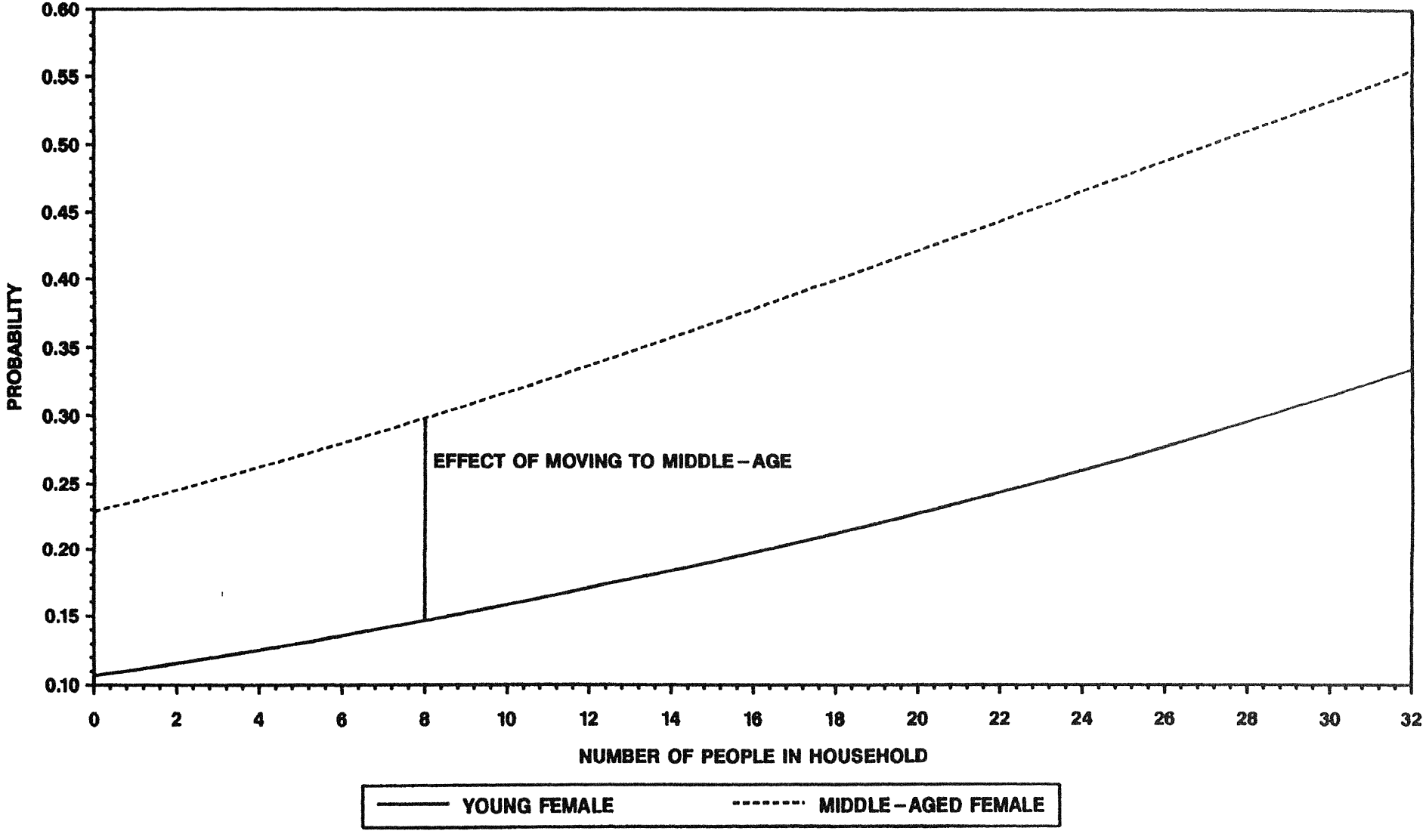
Independent variable **Borrower** is 1 if informant borrowed, 0 otherwise.

Variable	Estimated Coefficient	Standard Error	Significance[a]
Constant	-4.367	0.492	***
Household Size	0.045	0.015	***
Female	1.539	0.254	***
Middle-aged	0.907	0.289	**
Older	0.394	0.277	
Illiterate	0.705	0.471	
Koranic	0.900	0.436	**
Model Chi-square	86.789		***
Log-likelihood	-289.72		

[a]*** Significant at 1 percent.
** Significant at 5 percent.
* Significant at 10 percent.

Sample includes 126 borrowers and 590 non-borrowers.

ESTIMATED EFFECTS OF HOUSEHOLD SIZE AND SEX ON THE PROBABILITY OF BORROWING OVER NON-BORROWING



SOURCE: OSU AND LTC SURVEYS, 1993

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